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## CLAIMS

1. A substance which can specifically interact with sugar chains.

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2. A substance according to claim 1, wherein a level of the interaction between the substance and the sugar chains is such that a necessary dissociation energy when laser irradiation is performed in a MALDI-TOF is at least 5eV.

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3. A substance according to claim 1, which is bindable to a support.

4. A substance according to claim 1, wherein the substance comprises a functional group which can react with an aldehyde group in a fluid.

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5. A substance according to claim 4, wherein the functional group is selected from a group consisting of a hydroxylamino group, a N-alkylhydroxylamino group, a hydrazide group, a thiosemicarbazide group and a cysteine residue.

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6. A substance according to claim 1, wherein the interaction comprises a covalent bond.

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7. A substance according to claim 1, wherein the interaction comprises oxime bond, hydrazone bond, thiosemihydrazone bond, perhydrothiazine ring formation or thiazolidine ring formation.

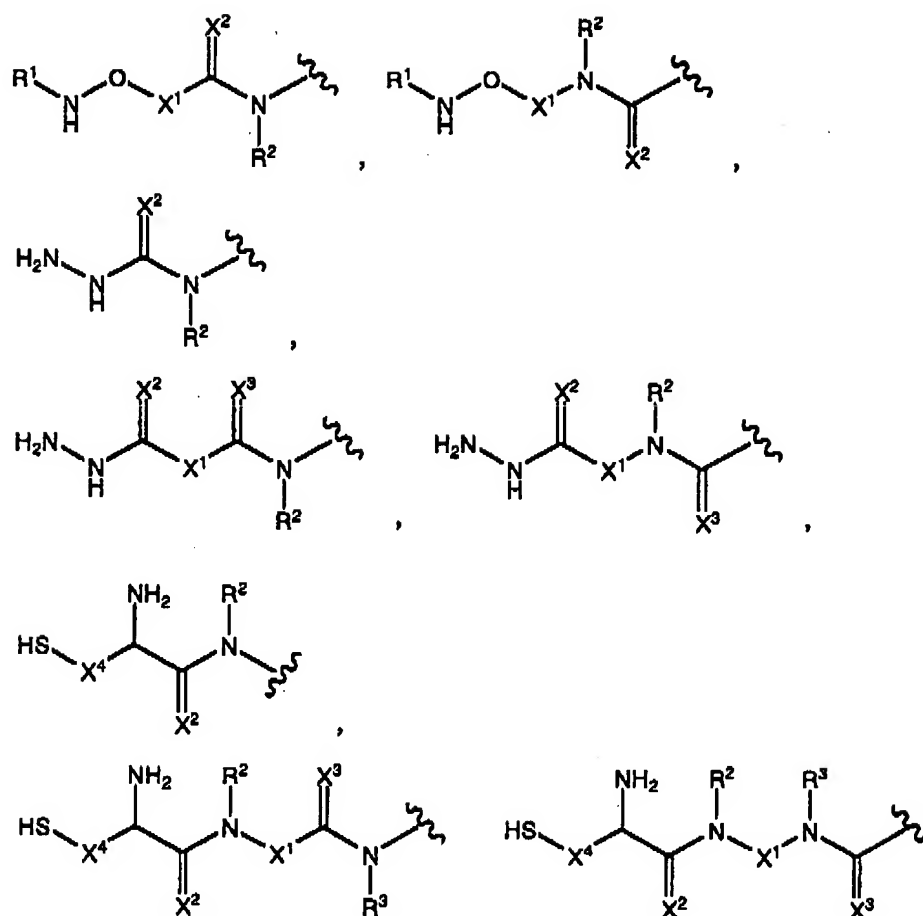
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8. A substance according to claim 1, represented by formula (I): X-Y-Z (I)

[herein, X is a group represented by formulae:

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(herein,  $X^1$  is alkylene which may be substituted or alkenylene which may be substituted,  $X^2$  is an oxygen atom or a sulfur atom,  $X^3$  is an oxygen atom or a sulfur atom,  $X^4$  is methylene or ethylene,  $R^1$  is a hydrogen atom or alkyl, and  $R^2$  and  $R^3$  are independently a hydrogen atom or alkyl);

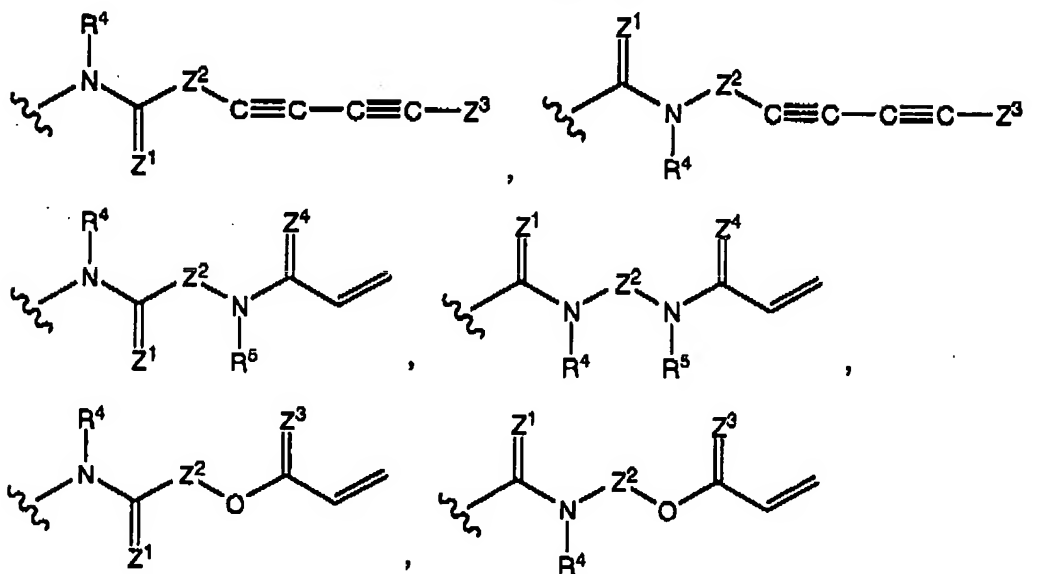
$Y$  is single bond; optionally substituted alkylene in which at least one group selected from the group consisting -O-, -S-, -S-S-, -N( $R^a$ )-C(=O)-, -C(=O)-N( $R^b$ )-, and phenylene which may be substituted, may intervene; or optionally substituted alkenylene in which at least one group selected from the group consisting -O-, -S-, -S-S-, -N( $R^a$ )-C(=O)-, -C(=O)-N( $R^b$ )-, and phenylene which may be substituted, may

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intervene (herein,  $R^a$  and  $R^b$  are independently a hydrogen atom or alkyl);

Z is a group represented by formulae:



- 5 (herein,  $Z^1$  is an oxygen atom or sulfur atom,  $Z^2$  and  $Z^3$  are independently optionally substituted alkylene in which phenylene may intervene, or optionally substituted alkenylene in which phenylene may intervene,  $Z^4$  is an oxygen atom or a sulfur atom,  $R^4$  and  $R^5$  are independently a hydrogen atom or alkyl)].
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9. A substance obtained by polymerizing the substance according to claim 8.

- 15 10. A substance according to claim 9, wherein the polymerization is initiated by UV-irradiation.

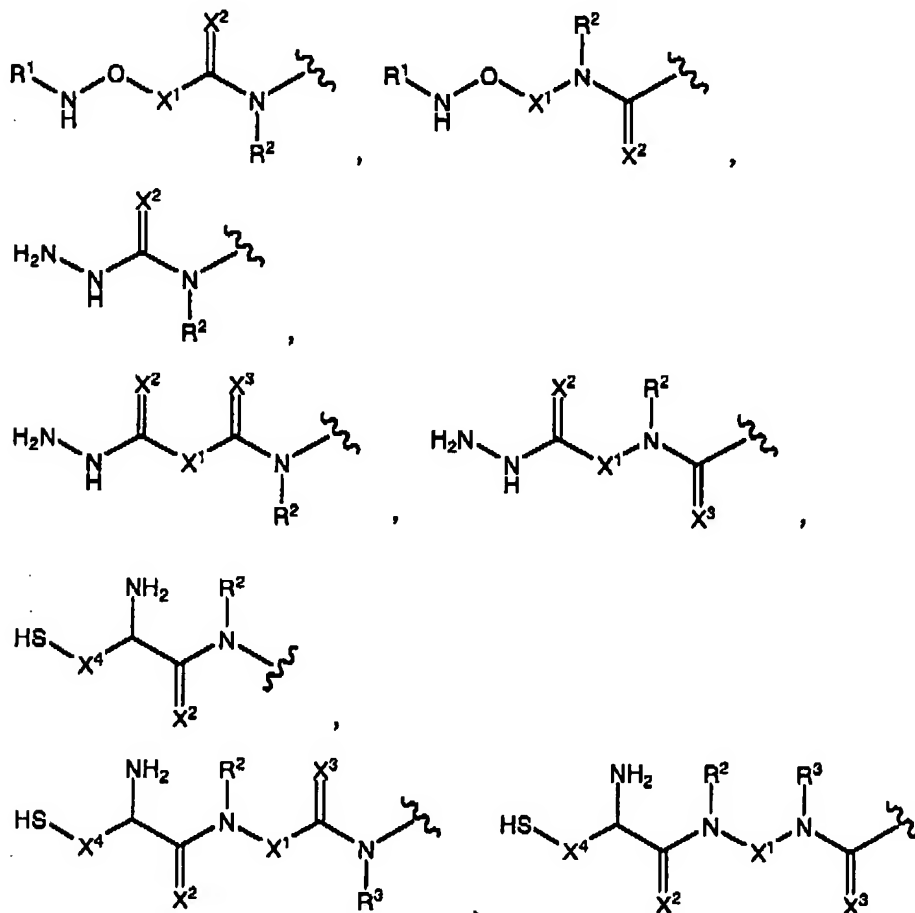
- 20 11. A substance according to claim 9, obtained by polymerizing a monolayer obtained by physical adsorption of Z site of the compound represented by formula (I) to a support.

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12. A substance according to claim 1, which is a copolymer obtained by polymerizing a compound represented by formula (I): X-Y-Z (I)

[herein, X is a group represented by formulae:



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(herein,  $X^1$  is alkylene which may be substituted or alkenylene which may be substituted,  $X^2$  is an oxygen atom or a sulfur atom,  $X^3$  is an oxygen atom or a sulfur atom,  $X^4$  is methylene or ethylene,  $R^1$  is a hydrogen atom or alkyl, and  $R^2$  and  $R^3$  are independently a hydrogen atom or alkyl);

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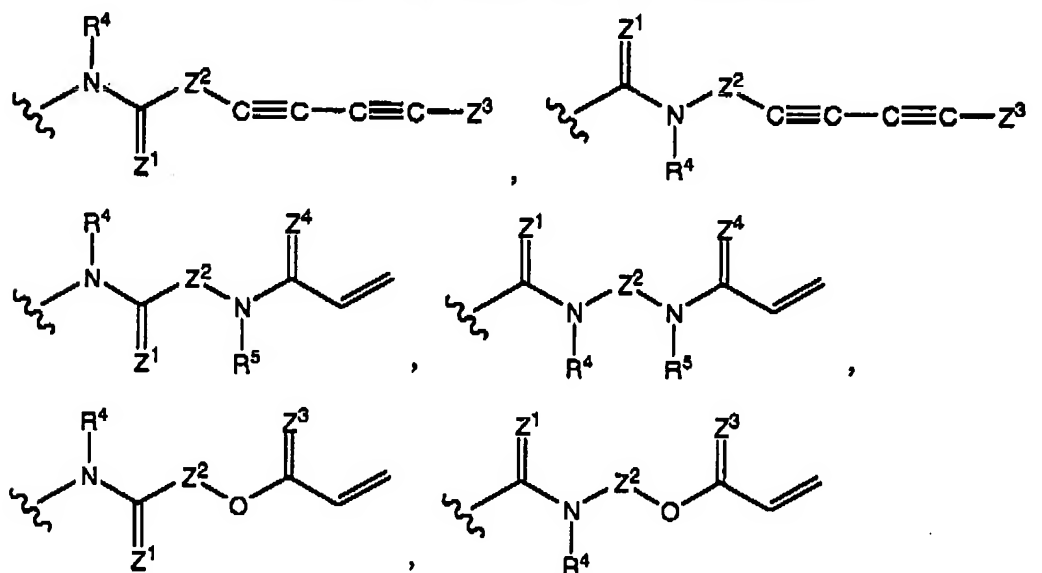
Y is single bond; optionally substituted alkylene in which at least one group selected from the group consisting -O-, -S-, -S-S-, -N( $R^a$ )-C(=O)-, -C(=O)-N( $R^b$ )-, and phenylene

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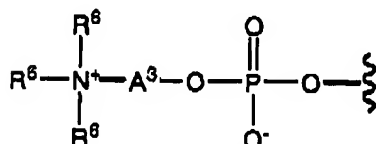
- which may be substituted, may intervene; or optionally substituted alkenylene in which at least one group selected from the group consisting -O-, -S-, -S-S-, -N(R<sup>a</sup>)-C(=O)-, -C(=O)-N(R<sup>b</sup>)-, and phenylene which may be substituted, may intervene (herein, R<sup>a</sup> and R<sup>b</sup> are independently a hydrogen atom or alkyl);

Z is a group represented by formulae:



- (herein, Z<sup>1</sup> is an oxygen atom or sulfur atom, Z<sup>2</sup> and Z<sup>3</sup> are independently optionally substituted alkylene in which phenylene may intervene, or optionally substituted alkenylene in which phenylene may intervene, Z<sup>4</sup> is an oxygen atom or a sulfur atom, R<sup>4</sup> and R<sup>5</sup> are independently a hydrogen atom or alkyl)]; and

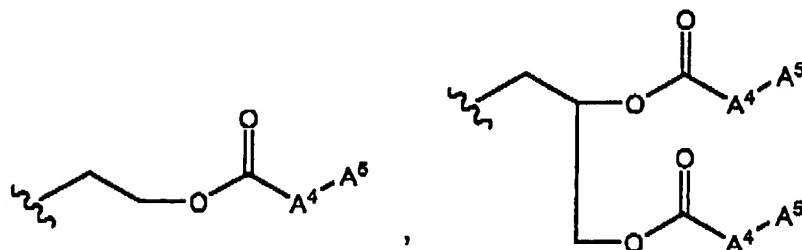
- a compound represented by formula (II): A<sup>1</sup>-A<sup>2</sup>(II)  
[herein, A<sup>1</sup> is H(OCH<sub>2</sub>CH<sub>2</sub>)<sub>n</sub>O- (n is an integer from 1 to 5) or a group represented by a formula:



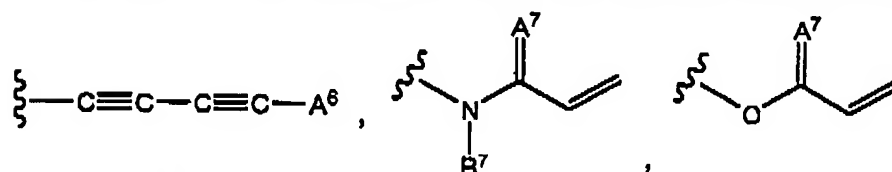
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(herein,  $A^3$  is alkylene, and  $R^6$  is alkyl); and  $A^2$  is a group represented by formulae:



(herein,  $A^4$  is alkylene, and  $A^5$  is represented by formulae:



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( $A^6$  is alkylene,  $A^7$  is an oxygen atom or a sulfur atom, and  $R^7$  is a hydrogen atom or alkyl)).

13. A substance according to claim 12, wherein the polymerization is initiated by UV-irradiation.

14. A substance according to claim 12, wherein mole fraction of the compound represented by formula (II) is 0.1 to 0.9.

15. A substance according to claim 12, obtained by polymerizing monolayers obtained by physical adsorption of Z site of the compound represented by formula (I) and  $A^2$  site of the compound represented by formula (II) to a support.

16. A substance according to claim 12, obtained by polymerizing water dispersion or a cast film of a mixture comprising the compound represented by formula (I) and the compound represented by formula (II).

17. A sugar chain-trapping carrier, comprising a substance

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which can specifically interact with sugar chains.

18. A sugar chain-trapping carrier, in which the substance according to claim 9 or 12 is transferred to a support.

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19. A method for synthesizing a substance which can specifically interact with sugar chains, comprising the steps of:

10 A) providing a functional group which can react with an aldehyde group in a fluid; and

B) binding the functional group to a desired substance.

15 20. A method for separating, concentrating, or purifying sugar chains or a sugar chain-containing substance in a sample, comprising the steps of:

20 a) contacting a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains with the sample in a fluid phase under conditions that the sugar chain-trapping carrier can react with the sugar chains or sugar chain-containing substance;

b) isolating a composite of the sugar chain-trapping carrier and the sugar chains or sugar chain-containing substance from the fluid phase; and

25 c) exposing the composite to the conditions that the interaction between the sugar chain-trapping carrier and the sugar chains or sugar chain-containing substance is at least partially eliminated.

30 21. A method according to claim 20, further comprising the step of liberating an aldehyde group in the sample before step a).

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22. A method according to claim 21, wherein the step of liberating the aldehyde group comprises a treatment by glycosidase and/or a hydrazinolysis.

5 23. A method according to claim 20, further comprising the step of:

d) subjecting the sample to the conditions where the sugar chain-containing substance is separated into sugar chains and the remainder.

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24. An apparatus for separating, concentrating, or purifying sugar chains or a sugar chain-containing substance in a sample, comprising:

a) a sample introduction section;

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b) a container having a space which can house a fluid phase; and

c) a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains, the container being in fluid communication with the sample introduction section.

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25. A system for separating, concentrating, or purifying sugar chains or a sugar chain-containing substance in a sample, comprising:

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A) an apparatus comprising:

a) a sample introduction section;

b) a container having a space which can house a fluid phase; and

c) a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains, the container being in fluid communication with the sample introduction section;

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B) means for isolating a composite of the sugar



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chain-trapping carrier and the sugar chains in the fluid phase; and

5 C) means for exposing the composite to the conditions that the interaction between the sugar chain-trapping carrier and the sugar chains is at least partially eliminated.

10 26. A method for manufacturing an apparatus for separating, concentrating, or purifying sugar chains or a sugar chain-containing substance in a sample comprising the steps of:

a) providing a substance which can specifically interact with sugar chains;

15 b) causing the substance which can specifically interact with sugar chains to interact with the support to produce a sugar chain-trapping carrier; and

c) fixing the sugar chain-trapping carrier to a container.

20 27. A method for analyzing sugar chains or a sugar chain-containing substance in a sample, comprising the steps of:

25 a) contacting a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains with the sample in a fluid phase under the conditions that the sugar chain-trapping carrier can react with the sugar chains;

b) exposing the sugar chain-trapping carrier and the sample to the conditions of desired stringency; and

30 c) identifying a substance interacted with the sugar chain-trapping carrier.

28. A method according to claim 27, wherein the identifying step c) includes a mass spectrometry analysis.

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29. A method for producing a sugar chain replica of a sample comprising or expected to comprise sugar chains, comprising the steps of:

5           a) locating a substance which can specifically interact with sugar chains on a surface of a two-dimensionally extended support, and contacting a surface on which the substance is not being located with a solid foil; and

10           b) contacting the sample comprising or expected to comprise sugar chains with the solid foil.

30. A sugar chain replica of a sample comprising or expected to comprise sugar chains, comprising:

15           a) solid foil;  
            b) a two-dimensionally extended support on which a substance which can specifically interact with sugar chains is located, the support for interacting with the solid foil; and

20           c) a component derived from the sample comprising or expected to comprise sugar chains, the component being trapped by the substance which can specifically interact with sugar chains.

25           31. A method for analyzing sugar chains on a sample comprising or expected to comprise sugar chains, comprising the steps of:

30           a) locating a substance which can specifically interact with sugar chains on a surface of a two-dimensionally extended support, and contacting the surface on which the substance is not located with a solid foil;

            b) contacting the sample comprising or expected to comprise sugar chains with the solid foil; and

            c) analyzing sugar chains existing on a surface of

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the solid foil.

32. An apparatus for analyzing sugar chains or a sugar chain-containing substance in a sample, comprising:

5           a) sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains; and

          b) means for identifying the sugar chains.

10       33. A device for analyzing sugar chains or a sugar chain-containing substance in a sample, comprising a support on which a substance which can specifically interact with sugar chains is located.

15       34. A method for diagnosing or differentiating a subject, comprising the step of:

          a) analyzing sugar chains or a sugar chain-containing substance in a sample derived from the subject using the device according to claim 33.

20       35. A system for analyzing sugar chains or a sugar chain-containing substance in a sample, comprising:

          a) sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains;

25           b) means for exposing the sugar chain-trapping carrier and the sample to the conditions of desired stringency; and

          c) means for identifying the sugar chains.

30       36. A method for manufacturing an apparatus for analyzing sugar chains or a sugar chain-containing substance in a sample, comprising the steps of:

          a) providing a substance which can specifically

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interact with sugar chains; and

b) causing the substance which can specifically interact with sugar chains to interact with the support to produce a sugar chain-trapping carrier.

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37. A method for producing a sugar chain array, comprising the steps of:

a) providing a support;

10 b) locating a substance which can specifically interact with sugar chains in a desired arrangement.

38. A method for analyzing a substance specifically binding to sugar chains or a sugar chain-containing substance in a sample, comprising the steps of:

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a) causing a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains to interact with the sugar chains or sugar chain-containing substance in a fluid phase to fix;

20 b) contacting the sugar chain-trapping carrier with the sample under the conditions expected that the substance specifically binding to sugar chains or a sugar chain-containing substance can react with the sugar chains;

25 c) exposing a mixture of the sugar chain-trapping carrier and the sample to the conditions of desired stringency; and

d) identifying the substance specifically binding to sugar chains or a sugar chain-containing substance.

30 39. A method according to claim 38, wherein the substance specifically binding to sugar chains or a sugar chain-containing substance is an antibody or lectin.

40. A device for analyzing a substance specifically binding

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to sugar chains or a sugar chain-containing substance in a sample, comprising:

- 5 a) a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains, in which the sugar chains or sugar chain-containing substance is fixed to the carrier by specific interaction.

10 41. A system for analyzing a substance specifically binding to sugar chains or a sugar chain-containing substance in a sample, comprising:

- 15 a) a device comprising a sugar chain-trapping carrier comprising a substance which can specifically interact with sugar chains, in which the sugar chains or sugar chain-containing substance is fixed to the carrier by specific interaction;

b) a sample introduction section;

c) means for exposing a mixture of the sugar chain-trapping carrier and the sample to the conditions of desired stringency; and

- 20 d) means for identifying the substance specifically binding to sugar chains or a sugar chain-containing substance.

25 42. A sugar chain composition having an increased sugar chain content, obtained by contacting a sample comprising sugar chains with a substance which can specifically interact with sugar chains, and then separating sugar chains in the interacted sample.

30 43. A sugar chain composition according to claim 42, wherein the substance which can specifically interact with sugar chains can specifically interact with any sugar chain at a certain level or higher.